

6-4 The student will demonstrate an understanding of the relationship between Earth's atmospheric properties and processes and its weather and climate. (Earth Science)

Key Concepts:

Atmospheric layers: troposphere, stratosphere, mesosphere, thermosphere, exosphere;

Air pressure;

Water cycle: precipitation, evaporation, transpiration, condensation, surface-water flow, groundwater flow;

Clouds: cumulus, cirrus, stratus; cumulonimbus, fog

Air movement: air masses, fronts, low pressure system, high pressure system;

Storms: thunderstorms, hurricanes, tornadoes;

Weather tools: wind speed-anemometer, wind direction-wind vane, air temperature-thermometer, humidity-sling psychrometer, air pressure-barometer;

Weather prediction: meteorologist, weather map, station model, isobar, isotherm, satellites, radar;

Solar energy: greenhouse effect;

Convection: tropical, temperate, polar convection regions, land and sea breezes, warm and cold ocean surface currents, climate;

Global winds: trade winds, westerly winds, polar winds;

Jet stream

Supporting Web Content

Windows To The Universe: [Layers of the Earth's Atmosphere](http://www.windows.ucar.edu/tour/link=/earth/Atmosphere/layers.html&edu=mid)

<http://www.windows.ucar.edu/tour/link=/earth/Atmosphere/layers.html&edu=mid>

Diagrams and text are used in this website to explain the five layers of the Earth's Atmosphere

Indicators: 6-4.1

NOAA- Jetstream-An Online School for Weather

[Layers of the Atmosphere](http://www.srh.noaa.gov/srh/jetstream/atmos/atmos_intro.htm)

http://www.srh.noaa.gov/srh/jetstream/atmos/atmos_intro.htm

Using diagrams and text, this website explains the layers of the Atmosphere

Indicators: 6-4.1

[The Water Cycle](http://www.fergusonfoundation.org)

<http://www.fergusonfoundation.org>

This interactive website uses diagrams and text to explain the stages of the water cycle. From home-page go to "kids zone".

Indicators: 6-4.2

Environmental Agency

[Water Cycle- Walter Droplet Explains the Water Cycle](http://www.national-aquarium.co.uk/interactive/water.asp)

<http://www.national-aquarium.co.uk/interactive/water.asp>

Through animations with sound this website explains the states of the water cycle.

Indicators: 6-4.2

University of Illinois

Cloud Types

[http://ww2010.atmos.uiuc.edu/\(Gh\)/guides/mtr/cld/cldtyp/home.rxml](http://ww2010.atmos.uiuc.edu/(Gh)/guides/mtr/cld/cldtyp/home.rxml)

Using photos and text, this website would be an excellent teaching tool to help students classify clouds.

Indicators: 6-4.3

NOAA- Jetstream- An Online School for Weather

Air Masses & Fronts

<http://www.srh.weather.gov/srh/jetstream/synoptic/airmass.htm>

This website would be useful in teaching the basic characteristics of air masses and front.

Indicators: 6-4.4

The Weather Channel

<http://www.weather.com>

This site provides current weather maps of the United States and local forecasts. It also provides hurricane tracking.

Indicators: 6-4.6

Suggested Literature

Elsom, Derek (1997) *Weather Explained: A Beginner's Guide to the Elements*. Holt

ISBN: 0-8050-4875-8

This beginner's guide captures your attention from the opening overview of weather through sections on the world's changing climate. The information and the inviting format of this book make it required reading for anyone curious about the weather.

Indicators: 6-4.8

Lauber, Patricia (1996) *Hurricanes: Earth's Mightiest Storms*. Scholastic

ISBN: 0-590-47406-5

This book is an amazing work that uses narrative very effectively in weaving the story of these powerful storms.

Indicators: 6-4.4

Kahl, Jonathan D. W. (1996) *Weather Watch: Forecasting The Weather*. Lerner

ISBN: 0-8225-2529-1

This book, written by a meteorologist, provides a clear, fact-filled survey of methods for observing, analyzing, and forecasting the weather. It includes directions for building a weather station using common objects.

Indicators: 6-4.5

Scholastic Atlas of Weather. (2004) QA International Scholastic Reference
ISBN: 0-439-41902-6

This book explains the ABC's of weather including dust storms, hail, hurricanes, volcanoes, global warming, pollution, and the technology and tools meteorologists use.

Indicators: 6-4.4, 6-4.5

Suggested Data Streaming Videos

Water Smart: The Sun, Water, And Climate (ETV Streamline SC)

All Segments (15:01)

This video explains the water cycle and goes beyond by encouraging students to become aware that the water cycle is far-reaching, never-ending and crucial to life.

Indicators: 6-4.2

Exploring Weather: Severe Weather_(ETV Streamline SC)

All Segments (18:07)

This program discusses the severe weather conditions that can be threatening to people and property. Thunderstorms, tornadoes, and hurricanes are highlighted in this video.

Indicators: 6-4.4

Weather Smart: Forecasting and Weather Instruments_(ETV Streamline SC)

All Segments (15:00)

This program shows the basics of weather forecasting. Students will learn about the symbols used on weather maps. The tools and instruments that meteorologists use to detect and measure clouds, precipitation, temperature, humidity and pressure are explored.

Indicators: 6-4.5

Rain or Shine: Understanding the Weather (ETV Streamline SC)

All Segments (15:00)

This program shows how weather predictions are made possible. Uneven air heating is analyzed. Cool and warm air masses (also called high and low pressure systems) are located on satellite photos and tracked. Cold fronts and warm fronts are explained.

Indicators: 6-4.4, 6-4.6

Earth Science: Weather and Climate (ETV Streamline SC)

Segments: How the Energy of Large Cities Affects Weather and Climate (3:19)

This segment is about global warming and how the balance of greenhouse gases is vital in regulating the temperature of the Earth. Also it shows how humans may be disturbing this delicate balance, creating the greenhouse effect and what can be done about it.

Indicators: 6-4.7

Career Connections

Meteorologist:

The largest percentage of meteorologists predict the weather. Some even become television personalities, sharing their predictions on nightly newscasts. To make accurate forecasts, the meteorologist must examine air pressure, temperature, humidity, and wind velocity within the context of physics, mathematics, and known patterns. Satellites, radar, and weather stations placed in strategic locations provide the data the meteorologist needs to do his job. A meteorologist's job is important because not only does the general public rely on the information he provides, but safety issues come into play as industry makes decisions based on the weather. These decisions involve travel, events, and employee safety.

Hurricane Trackers

The more we know about how strong the hurricane is, how fast it's going, and where it will hit, the more we can protect ourselves. This is the job of hurricane trackers at places like the National Hurricane Center and the Federal Emergency Management Agency. Hurricane trackers get pictures from satellites, and hurricane hunting airplanes fly right into the middle, or the "eye," of the hurricane to measure the size and strength of the storm. They also use weather ships and buoys that float in the water and send radio signals about what's going on with the wind and the water. Hurricane trackers like helping to save people's lives and homes. They especially like the challenge of fighting the storm, using math and computers against the power of rain and wind.